



# **SAURASHTRA UNIVERSITY**

**RAJKOT – INDIA**



**CURRICULAM**

**for**

**Bachelor of Computer Applications**

**(Semester 5 and Semester 6)**

**To be effective from June – 2024**



| <b>BCA SEM 5</b> |  |                                     |                                  |
|------------------|--|-------------------------------------|----------------------------------|
| <b>SR. NO</b>    | <b>SUBJECT</b>   | <b>NO. OF THEORY LECT. PER WEEK</b> | <b>NO. OF PRACTICAL PER WEEK</b> |
| 1                | <b>CS – 25:</b> Advance Java Programming (J2EE)          | 5                                   | 6                                |
| 2                | <b>CS – 26:</b> Programming in Python                    | 5                                   | 6                                |
| 3                | <b>CS – 27:</b> Cyber Security                           | 5                                   | 6                                |
| 4                | <b>CS – 28:</b> Practical – 1 (Based on CS-25)           | -                                   | 6                                |
| 5                | <b>CS – 29:</b> Practical – 2 (Based on CS-26 and CS-27) | -                                   | 6                                |
| 6                | <b>CS – 30:</b> PROJECT VIVA                             | -                                   | 6                                |

| <b>BCA SEM 6</b> |  |                                     |                                  |
|------------------|--|-------------------------------------|----------------------------------|
| <b>SR. NO</b>    | <b>SUBJECT</b>   | <b>NO. OF THEORY LECT. PER WEEK</b> | <b>NO. OF PRACTICAL PER WEEK</b> |
| 1                | <b>CS – 31:</b> Mobile Application Development in Android using Kotlin | 5                                   | 6                                |
| 2                | <b>CS – 32:</b> Programming with ASP.NET                               | 5                                   | 6                                |
| 3                | <b>CS – 33:</b> Machine Learning with Python                           | 5                                   | 6                                |
| 4                | <b>CS – 34:</b> Practical – 1 (Based on CS-31)                         | -                                   | 6                                |
| 5                | <b>CS – 35:</b> Practical – 2 (Based on CS-32 and CS-33)               | -                                   | 6                                |
| 6                | <b>CS – 36:</b> PROJECT VIVA   | -                                   | 6                                |



| <b>BCA SEM 5</b> |  |                                     |                                  |
|------------------|--|-------------------------------------|----------------------------------|
| <b>SR. NO</b>    | <b>SUBJECT</b>   | <b>NO. OF THEORY LECT. PER WEEK</b> | <b>NO. OF PRACTICAL PER WEEK</b> |
| 1                | <b>CS – 25:</b> Advance Java Programming (J2EE)          | 5                                   | 6                                |
| 2                | <b>CS – 26:</b> Programming in Python                    | 5                                   | 6                                |
| 3                | <b>CS – 27:</b> Cyber Security                           | 5                                   | 6                                |
| 4                | <b>CS – 28:</b> Practical – 1 (Based on CS-25)           | -                                   | 6                                |
| 5                | <b>CS – 29:</b> Practical – 2 (Based on CS-26 and CS-27) | -                                   | 6                                |
| 6                | <b>CS – 30:</b> PROJECT VIVA                             | -                                   | 6                                |



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| <b>CS-25: Advance Java Programming (J2EE)</b>   |                               |   |
|---|-------------------------------|---|
| <b>Objectives:</b> <ul style="list-style-type: none"> <li>Gain a deep understanding of the principles of J2EE architecture, including servlets, JSP, EJB.</li> <li>Proficiency in frameworks and technologies like spring framework, hibernate, struts.</li> <li>Learn about the Model-View-Controller (MVC) design pattern and its application in J2EE development.</li> </ul> <b>Prerequisites:</b> <ul style="list-style-type: none"> <li>Core Java Knowledge</li> </ul> |                               |   |
| <b>Unit No.</b>   | <b>Topic</b>                  | <b>Detail</b>   |
| <b>1</b>  | Introduction to J2EE and JDBC | <ul style="list-style-type: none"> <li>Introduction to J2EE</li> <li>Enterprise Architecture Styles:               <ul style="list-style-type: none"> <li>Two-Tier Architecture</li> <li>Three-Tier Architecture</li> <li>N-Tier Architecture</li> </ul> </li> <li>Enterprise Architecture</li> <li>The J2EE Platform</li> <li>Introduction to J2EE APIs (Servlet, JSP, EJB, JMS, JavaMail, JSF, JNDI)</li> <li>Introduction to Containers</li> <li>Tomcat as a Web Container</li> </ul>          |
|   |                               | <ul style="list-style-type: none"> <li>JDBC Architecture,</li> <li>Types of JDBC Drivers,</li> <li>Introduction to major JDBC Classes and Interface,</li> <li>Creating simple JDBC Application,</li> <li>Types of Statement (Statement Interface, PreparedStatement, CallableStatement),</li> <li>Creating CRUD Application</li> </ul>  |
| <b>2</b>  | Servlet, RMI                  | <ul style="list-style-type: none"> <li>Servlet Introduction</li> <li>Architecture of a Servlet</li> <li>Servlet API (javax.servlet and javax.servlet.http)</li> <li>Servlet Life Cycle</li> <li>Servlet Configuration with Deployment Descriptor</li> <li>Developing and Deploying Servlets</li> <li>Handling Servlet Requests and Responses</li> <li>Reading Initialization Parameters</li> <li>Session Tracking Approaches (URL Rewriting, Hidden Form Fields, Cookies, Session API)</li> </ul> |
|   |                               | <ul style="list-style-type: none"> <li>RMI overview</li> <li>RMI architecture</li> <li>Stub and Skeleton</li> </ul>   |



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|          |  |  |
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|          |  | <ul style="list-style-type: none"> <li>• Developing and Executing RMI application</li> </ul>   |
| <b>3</b> | JSP, EJB   | <ul style="list-style-type: none"> <li>• Introduction to JSP and JSP Basics</li> <li>• JSP vs. Servlet</li> <li>• JSP Architecture</li> <li>• Life cycle of JSP</li> <li>• JSP Elements: <ul style="list-style-type: none"> <li>▪ Directives Elements (page, include, taglib)</li> <li>▪ Scripting Elements (Declaration, scriptlet, expression)</li> <li>▪ Action Elements (jsp:param, jsp:include, jsp:Forward, jsp:plugin, jsp:useBean, jsp:setAttribute, jsp:getAttribute)</li> </ul> </li> <li>• JSP Implicit Objects (request, response, out, session, application, pagecontext)</li> <li>• JSP Scope</li> <li>• Including and Forwarding from JSP Pages <ul style="list-style-type: none"> <li>▪ include Action</li> <li>▪ forward Action</li> </ul> </li> <li>• Working with Session &amp; Cookie in JSP</li> <li>• Error Handling and Exception Handling with JSP</li> <li>• JSP EL (Expression Language), JSP Standard Tag Libraries (JSTL)</li> </ul> |
| <b>4</b> | EJB,<br>Introduction<br>of MVC<br>Architecture,<br>Hibernate | <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Benefits of EJB</li> <li>• Restriction on EJB</li> <li>• Types of EJB</li> <li>• Session Beans</li> <li>• Entity Beans</li> <li>• Message-driven beans</li> <li>• Timer service</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Introduction to MVC</li> <li>• Implementation of MVC Architecture</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Introduction to Hibernate</li> <li>• Features of Hibernate</li> <li>• Exploring Hibernate Architecture</li> <li>• Object Relation Mapping (ORM) with Hibernate</li> <li>• Hibernate Configuration file</li> <li>• Hibernate Mapping file</li> <li>• Hibernate Annotation</li> <li>• Hibernate Query Language (HQL)</li> <li>• Hibernate Sessions</li> </ul>   |



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|   |  |   |
|---|--|---|
| 5 | Introduction of Spring, Spring Boot and Struts | <ul style="list-style-type: none"> <li>• Introduction of Spring Framework</li> <li>• Spring Architecture</li> <li>• Spring Framework definition</li> <li>• Spring &amp; MVC</li> <li>• Spring Context definition</li> <li>• Aspect Oriented programming in Spring (AOP)</li> <li>• Introduction of Spring Boot               <ul style="list-style-type: none"> <li>▪ Spring Boot Features</li> <li>▪ Comparison between Spring and Spring Boot</li> <li>▪ Spring Boot Annotations</li> </ul> </li> </ul> |
|   |  | <ul style="list-style-type: none"> <li>• Understanding Struts Framework</li> <li>• Comparison with MVC using RequestDispatcher and the EL</li> <li>• Struts Flow of Control</li> <li>• Processing Requests with Action Objects</li> <li>• Handling Request Parameters with FormBeans</li> <li>• Prepopulating and Redisplaying Input Forms</li> <li>• Using Properties Files</li> </ul>   |

**Reference Books:**

- (1) Java Complete Reference 11th Edition - Herbert Schildt, Oracle Press
- (2) Java Server Programming For Professionals, Ivan Bayross, Sharanam Shah – Shroff publication
- (3) Developing Java Servlets – Techmedia
- (4) JSP Beginner’s Guide – Tata McGraw Hill by Gary Bolling, Bharathi Nataragan
- (5) Spring and Hibernate, K. Santosh Kumar, - Tata McGraw-Hill
- (6) Hibernate Made Easy: Simplified Data Persistence with Hibernate and JPA (Java Persistence API) Annotations by Cameron Wallace McKenzie, Kerri Sheehan
- (7) Spring Framework: A Step by Step Approach for Learning Spring Framework - CreateSpace Independent Publishing Platform
- (8) Beginning Hibernate Second Edition By Jeff Linwood, Dave Minte – Apress

**Course Outcomes:**

- Students should gain a comprehensive understanding of the architecture of J2EE, including its various tiers such as presentation, business logic, and data tiers.
- Students should be able to develop enterprise applications using J2EE technologies, including the ability to design and implement user interfaces, business logic, and data access layers.
- Students should be proficient in using various Java EE APIs for developing enterprise applications, including Servlets, JavaServer Pages (JSP), Enterprise JavaBeans (EJB).
- Understands and implements RMI, JSP and frameworks like Spring, Struts etc.
- Understand and apply the concepts of MVC and tag libraries.



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| <b>CS-26: Programming in Python</b>  |                        |   |
|--|------------------------|---|
| <p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• Understanding basic syntax of python and emphasize the importance of writing clear and concise code documentation and comments.</li> <li>• Familiarize students with Python’s style guide and best practices for writing Pythonic code.</li> <li>• Familiarize students with built-in data structures in Python such as lists, tuples, dictionaries etc.</li> </ul> <p><b>Prerequisites:</b></p> <ul style="list-style-type: none"> <li>• Basic Computer Skills.</li> <li>• Fundamental Programming Concepts.</li> <li>• Problem-Solving Skills.</li> </ul> |                        |   |
| <b>Unit No.</b>  | <b>Topic</b>           | <b>Detail</b>   |
| <b>1</b>   | Introduction to Python | <ul style="list-style-type: none"> <li>• The basic elements of Python</li> <li>• Branching programs</li> <li>• Strings and Input</li> <li>• Iteration</li> <li>• Functions and Scoping, Specifications, Recursion</li> <li>• Global variables, Modules, Files</li> <li>• Tuples, Lists and Mutability</li> <li>• Functions as Objects, Strings</li> <li>• Tuples and Lists, Dictionaries</li> </ul> |
| <b>2</b>   | OOP using Python       | <ul style="list-style-type: none"> <li>• Handling exceptions,</li> <li>• Exceptions as a control flow mechanism,</li> <li>• Assertions, Abstract Data Types and Classes,</li> <li>• Inheritance,</li> <li>• Encapsulation and information hiding,</li> <li>• Search Algorithms, Sorting Algorithms,</li> <li>• Hashtables</li> </ul>  |
| <b>3</b>   | Plotting using PyLab   | <ul style="list-style-type: none"> <li>• Plotting using PyLab,</li> <li>• Plotting mortgages and extended examples,</li> <li>• Fibonacci sequence revisited, Dynamic programming and the 0/1 Knapsack algorithm,</li> <li>• Dynamic programming and divide and conquer</li> </ul>   |



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|          |  |  |
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| <b>4</b> | Network Programming and GUI using Python | <ul style="list-style-type: none"> <li>• Network Programming: <ul style="list-style-type: none"> <li>▪ Protocol, Sockets,</li> <li>▪ Knowing IP Address,</li> <li>▪ URL, Reading the Source Code of a Web Page,</li> <li>▪ Downloading a Web Page from Internet,</li> <li>▪ Downloading an Image from Internet,</li> <li>▪ A TCP/IP Server, A TCP/IP Client,</li> <li>▪ A UDP Server, A UDP Client,</li> <li>▪ File Server, File Client,</li> <li>▪ Two-Way Communication between Server and Client,</li> <li>▪ Sending a Simple Mail.</li> </ul> </li> <li>• GUI Programming: <ul style="list-style-type: none"> <li>▪ Event-driven programming paradigm;</li> <li>▪ creating simple GUI;</li> <li>▪ buttons, labels, entry fields, dialogs;</li> <li>▪ widget attributes - sizes, fonts, colors, layouts, nested frames</li> </ul> </li> </ul> |
| <b>5</b> | Connecting with Database                 | <ul style="list-style-type: none"> <li>• Verifying the MySQL dB Interface Installation,</li> <li>• Working with MySQL Database,</li> <li>• Using MySQL from Python,</li> <li>• Retrieving All Rows from a Table,</li> <li>• Inserting Rows into a Table,</li> <li>• Deleting Rows from a Table,</li> <li>• Updating Rows in a Table,</li> <li>• Creating Database Tables through Python</li> </ul>   |

**Reference Books:**

- “Core Python Programming” by Dr. R. Nageswara Rao – 2017 Edition, Dreamtech Press
- John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India
- Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python, Pearson
- Wesley J Chun, Core Python Applications Programming, 3rd Edition. Pearson
- Michael Bowles, Machine Learning in Python, Essential techniques for predictive analysis, Wiley

**Course Outcomes:**

- Understand the concept of programming with Python
- Understand the OOP using Python
- Implementing the plotting using PyLab
- Understand the Network Programming and GUI
- Understand and Implement database connectivity





**CS-27: Cyber Security**

**Objectives:**

- Learn the foundations of Cyber Security and threat landscape.
- To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of cyber security.
- To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.

**Prerequisites:**

- Basic Computer Skills.
- OS and Programming knowledge, Networking Fundamentals
- Critical Thinking and Problem-Solving Skills

| Unit No. | Topic                          | Detail  |
|----------|--------------------------------|---|
| 1        | Introduction to Cyber Security | <ul style="list-style-type: none"> <li>• Defining Cyberspace and Overview of Computer and Web-technology</li> <li>• Architecture of cyberspace,</li> <li>• Communication and web technology,</li> <li>• Internet, World wide web,</li> <li>• Advent of internet,</li> <li>• Internet infrastructure for data transfer and governance,</li> <li>• Internet society,</li> <li>• Regulation of cyberspace</li> <li>• Concept of cyber security</li> <li>• Issues and challenges of cyber security</li> </ul>   |
| 2        | Cyber Crime and Cyber law      | <ul style="list-style-type: none"> <li>• Classification of cyber crimes</li> <li>• Common cyber crimes                             <ul style="list-style-type: none"> <li>▪ cyber crime targeting computers and mobiles</li> <li>▪ Cyber crime against women and children</li> <li>▪ Financial frauds</li> <li>▪ Social engineering attacks</li> <li>▪ Malware and ransomware attacks</li> <li>▪ Zero day and zero click attacks</li> </ul> </li> <li>• Cybercriminals modus-operandi</li> <li>• Reporting of cyber crimes</li> <li>• Remedial and mitigation measures</li> <li>• Legal perspective of cyber crime</li> <li>• IT Act 2000 and its amendments</li> <li>• Cyber crime and offences</li> <li>• Organisations dealing with Cyber crime and Cyber Security in India</li> <li>• Case studies</li> </ul> |



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|          |   |  |
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| <b>3</b> | Social Media Overview and Security                                  | <ul style="list-style-type: none"> <li>• Introduction to Social networks</li> <li>• Types of Social media</li> <li>• Social media platforms</li> <li>• Social media monitoring</li> <li>• Hashtag</li> <li>• Viral content</li> <li>• Social media marketing, Social media privacy</li> <li>• Challenges, opportunities and pitfalls in Online Social Network</li> <li>• Security issues related to social media</li> <li>• Flagging and reporting of inappropriate content</li> <li>• Laws regarding posting of inappropriate content</li> <li>• Best practices for the use of Social media</li> <li>• Case studies</li> </ul>  |
| <b>4</b> | E-commerce and Digital Payments                                     | <ul style="list-style-type: none"> <li>• Definition of E-Commerce</li> <li>• Main components of E-Commerce</li> <li>• Elements of E-Commerce security</li> <li>• E-Commerce threats</li> <li>• E-Commerce security best practices</li> <li>• Introduction to digital payments</li> <li>• Components of digital payment and stake holders</li> <li>• Modes of digital payments: <ul style="list-style-type: none"> <li>○ Banking Cards</li> <li>○ Unified Payment Interface (UPI)</li> <li>○ e-Wallets</li> <li>○ Unstructured Supplementary Service Data (USSD)</li> <li>○ Aadhar enabled payments</li> </ul> </li> <li>• Digital payments related common frauds and preventive measures</li> <li>• RBI guidelines on digital payments and customer protection in unauthorized banking transactions</li> <li>• Relevant provisions of Payment Settlement Act, 2007.</li> </ul> |
| <b>5</b> | Digital Devices Security, Tools and Technologies for Cyber Security | <ul style="list-style-type: none"> <li>• End Point device and Mobile Phone security</li> <li>• Password policy</li> <li>• Security patch management</li> <li>• Data backup</li> <li>• Downloading and management of third party software</li> <li>• Device security policy</li> <li>• Cyber Security best practices</li> <li>• Significance of host firewall and Anti-virus</li> <li>• Management of host firewall and Anti-virus</li> <li>• Wi-Fi security</li> <li>• Configuration of basic security policy and permissions</li> </ul>   |



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**Reference Books:**

- Cyber Crime Impact in the New Millenium, by R. C. Mishra, Auther Press. Edition 2010.
- Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
- Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform (Pearson, 13<sup>th</sup> November, 2001)
- Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt. Ltd.
- Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers
- Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2<sup>nd</sup> Edition, Wiley India Pvt. Ltd.
- Fundamentals of Network Security by E. Maiwald, McGraw Hill.

**Course Outcomes:**

- After completion of this module, students would be able to understand the concept of Cyber security and issues and challenges associated with it.
- Understand the cyber crimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- Able to appreciate various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.
- Understand the basic concepts related to E-commerce and digital payments.
- Familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.
- Understand the basic security aspects related to Computer and Mobiles.
- Able to use basic tools and technologies to protect their devices.

**Suggested Practical:**

- Unit 2:
  - 1) Checklist for reporting cyber crime at Cyber crime Police station.
  - 2) Checklist for reporting cyber crime online.
  - 3) Reporting phishing emails.
  - 4) Demonstration of email phishing attack and preventive measures.
- Unit 3:
  - 1) Basic checklist, privacy and security settings for popular Social media platforms.
  - 2) Reporting and redressal mechanism for violations and misuse of Social media platforms.
- Unit 4:
  - 1) Configuring security settings in Mobile Wallets and UPIs
  - 2) Checklist for secure net banking



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- Unit 5:
  - 1) Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
  - 2) Setting and configuring two factor authentications in the Mobile phone.
  - 3) Security patch management and updates in Computer and Mobiles.
  - 4) Managing Application permissions in Mobile Phone.
  - 5) Installation and configuration of computer Anti-virus.
  - 6) Installation and configuration of Computer Host Firewall.
  - 7) Wi-Fi security management in computer and mobile.



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| <b>CS-28 : Practical And Viva Based On CS – 25</b> |       |
|--|-------|
| Topics   | Marks |
| CS – 25  | 100   |

| <b>CS-29 : Practical And Viva Based On CS – 26 and CS-27</b> |       |
|--|-------|
| Topics   | Marks |
| CS – 26 and CS - 27  | 100   |

**Note:**

- Practical examination may be arranged before or after theory exam.

| <b>CS-30 : Project Viva</b>  | <b>Total Marks: 100</b> |
|--|-------------------------|
| Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of previous semester or current semester. <b><u>(At the time of Project-Viva Examinations student must show all the Workouts, SDLC, Documentation, Program codes and project in running mode)</u></b> |                         |

**Note:**

- Project must be submitted before two weeks of commencement of theory exam.
- Project viva examination may be arranged before or after theory exam.
- During the project viva examination project must be run.